Sustainable Conservation

# Air Quality Issues and Dairy Methane Digesters in CA

***Presented by*** **– Allen Dusault**

# Presentation Overview

- Intro. to Sustainable Conservation
- CA dairy industry profile
- Digester status in CA
- Air quality Issues
- Solutions
- Lessons learned

# Sustainable Conservation

- Environmental non-profit
- 20 employees
- Collaborative solutions
- Industry focus:  agriculture & transportation
- Geographical focus: California

Sustainable Conservation

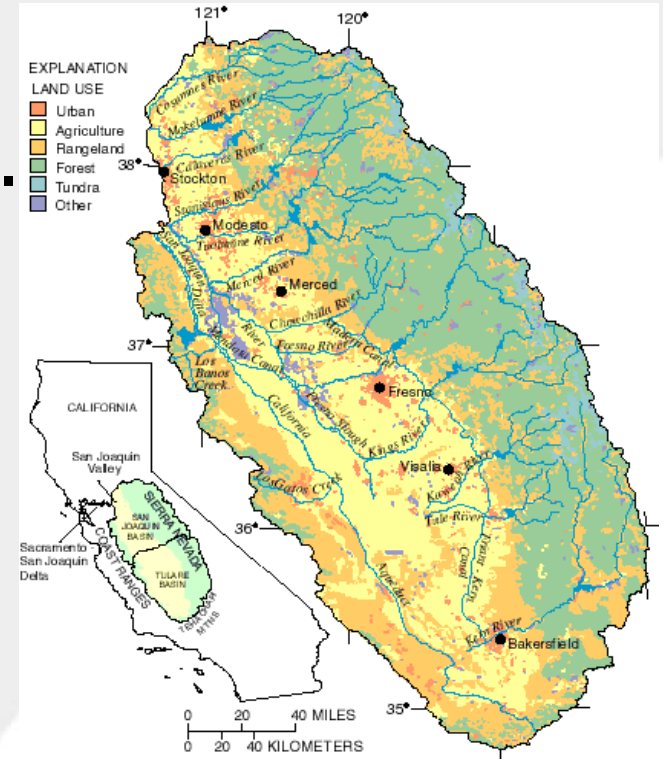
# Sustainable Conservation Partners

- Dairy trade associations
  - Western United Dairymen
  - Milk Producers Council
  - CA Dairy Campaign

- UC Davis, Cal State Fresno, Cal Poly
- Regulators – federal, state, local
- Researchers, Farmers, Environmentalist

# California's Dairy Industry

- CA largest dairy state in U.S.
- $4 billion in annual revenue
- Geographic concentration
  - Central Valley
  - Over 1 million cows
  - Average ~1000 cows
  - ~25 million tons manure




Sustainable Conservation

# Rationale for Digesters in CA

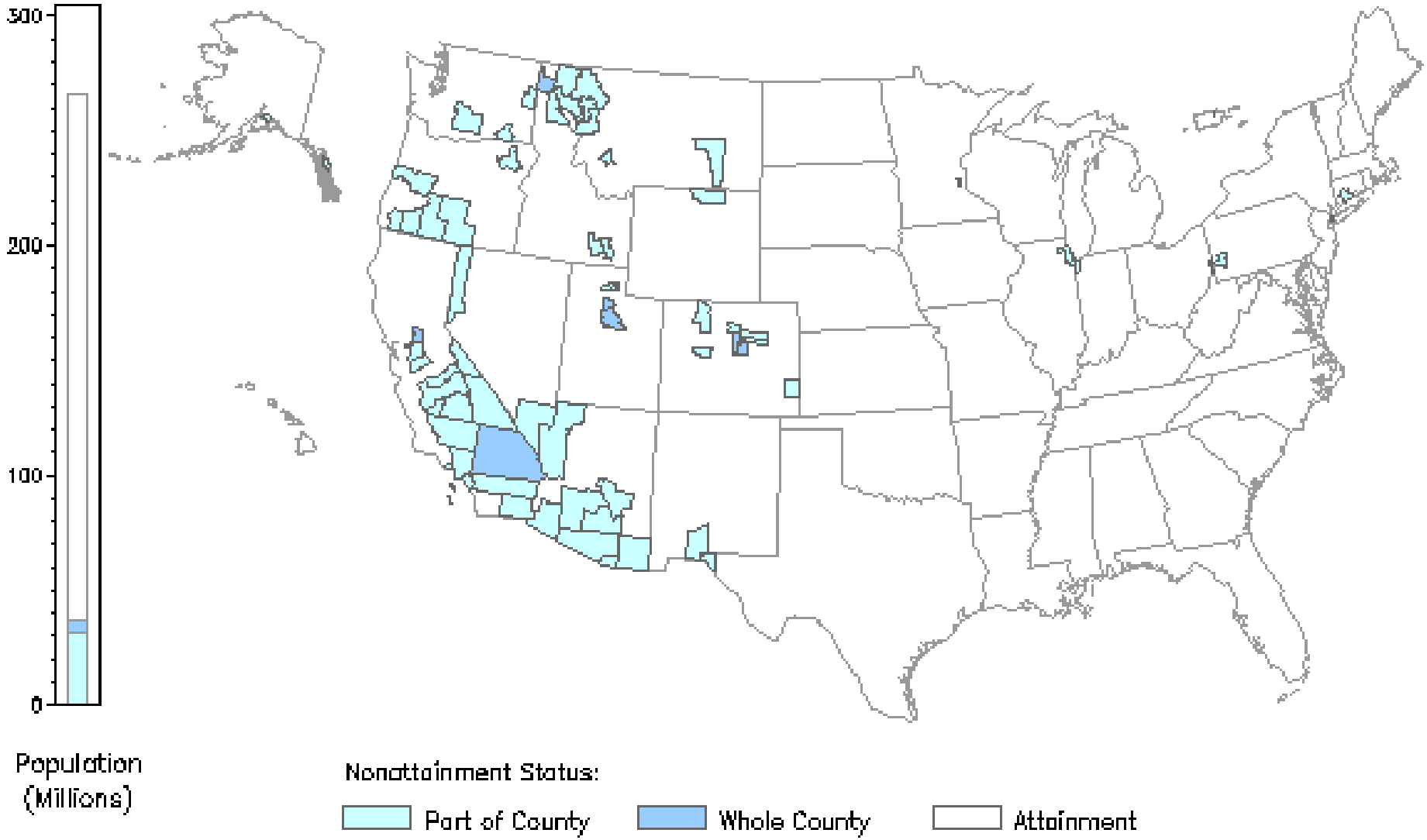
- Energy Crisis of 2001-2
- SB5 X - $15 million for digesters
- GHG and water quality
- Central Valley non-attainment
  - Ozone
  - Particulate Matter

Sustainable Conservation

# UNITED STATES

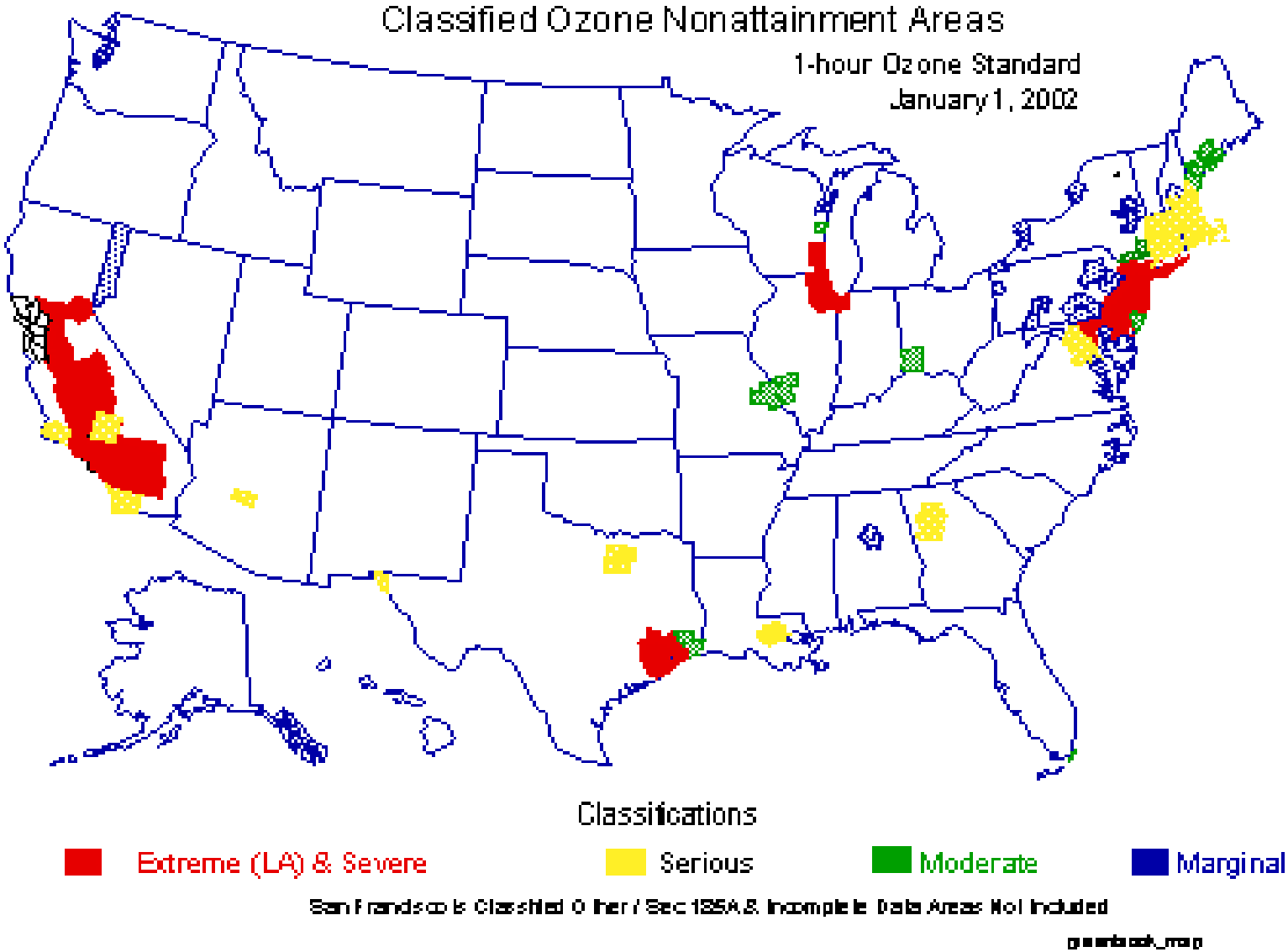
## Nonattainment Designations for Particulate Matter (PM10) as of January 2002

AIR Data




Source: US EPA Office of Air and Radiation, AIRS Database

01/16/02


Classified Ozone Nonattainment Areas
1-hour Ozone Standard
January 1, 2002
Classifications
Extreme (LA) & Severe
Serious
Moderate
Marginal
San Francisco is Classified Other / Sec 185A & Incomplete Data Areas Not Included
greenbook_map

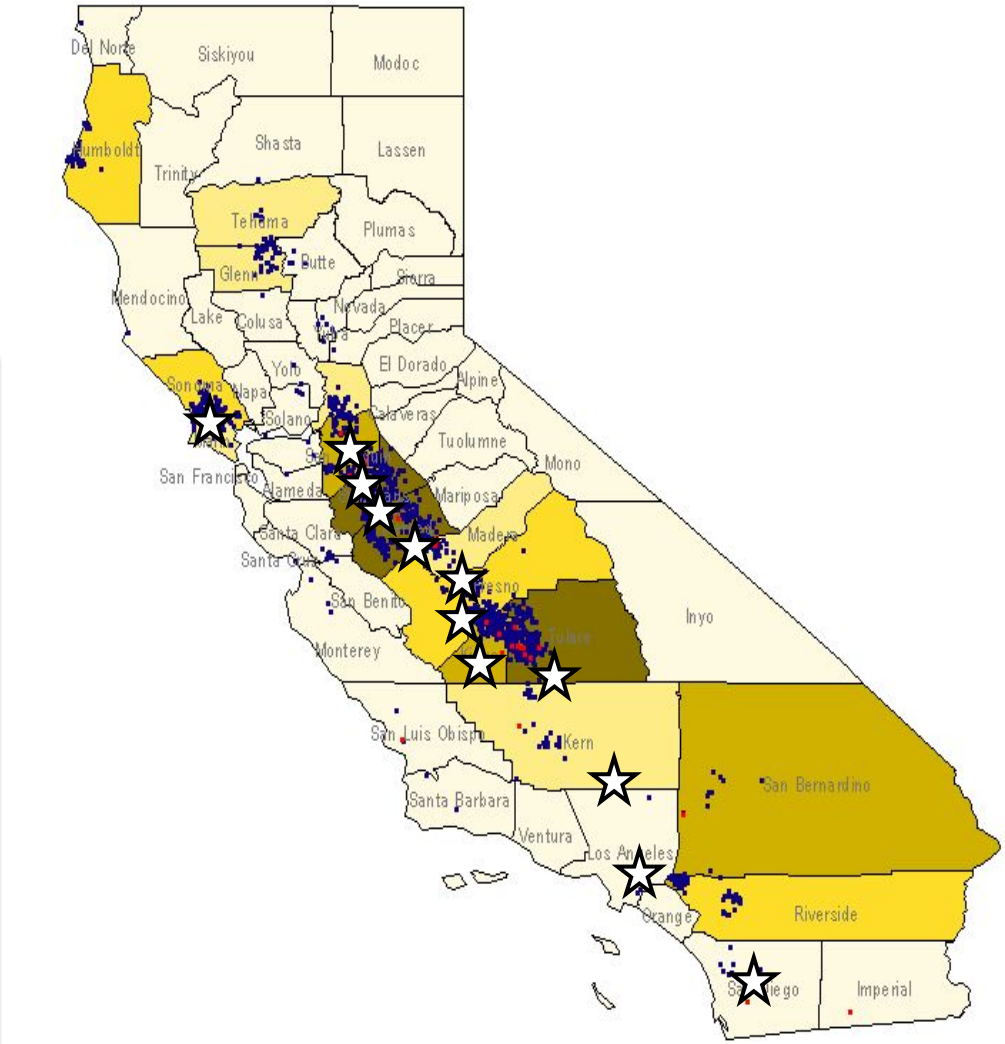
# Dairy Digesters Status

- Dozen new digesters in CA
- Several planned in SMUD territory
- Greenhouse gas trade by IEUA
- Considered BACT for air quality
- AB 728 passed (net metering)

# Net Metering for Digesters- AB 728

- Net metering credits generation
- Facilitates interconnection to grid
- Does not provide retail rates
- Most dairies generate excess power
  - Surplus power uncompensated
- Environmentalist won’t support

# Constructed Digesters in CA

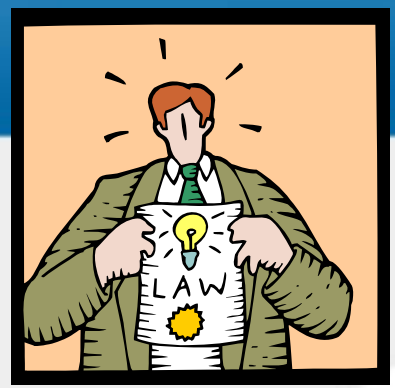



Sustainable Conservation

# Digesters and Air Quality Issues

- Destroys ROGs (VOCs)
  - An ozone precursor
  - Issue for SJVAPCD
- Ammonia a Problem (PM)?
- NOx emissions
  - IC engines emit
  - Air District requires mitigation
  - CA Environmentalist & net metering

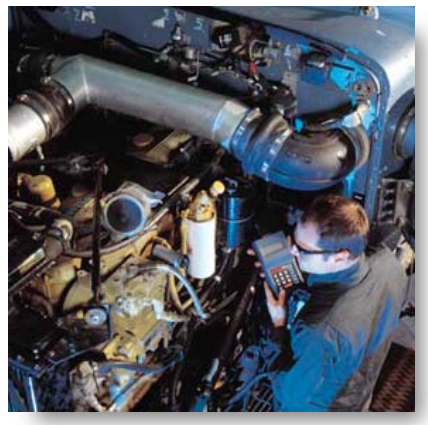
# Regulatory Requirements




- Air District requires ~ 50ppm NOx
- Lean burn engines mostly not available
- BACT as per CARB is 50 ppm NOx
  - Based on Large Wastewater Treatment Plants and Landfills
- SB 1298 Target for 2007 is Lower
  - How to swallow (inhale?) less than 10ppm
  - Regulators belief on forcing change

# What to Do?

- H2S Removal & Catalyst Expensive & Complex
- Lean Burn Engines Too Large for Most Dairies
- Farmers Avoid Complex Solutions
  - May Not Decide to Put in New Digesters
  - Current Digesters May be Abandoned
- Need for catalytic converter
  - H2S must be removed
  - Expensive and lots of maintenance



# Innovative Methods to Reduce NOx?

- New technologies
  - Better catalytic converters
  - Microturbines (failed so far)
  - Stirling engine (experimenting)
  - Other
- Centralized digesters?
  - SMUD Project
- Not sure can get to under 10ppm

# Worse Case Scenario?

- Flare biogas
- Stop building digesters
- Force existing digesters to shutdown
- Move dairies out of State
- Seek other uses

# Digesters – Beyond Electricity
# Cow Power Instead of Horsepower?

- Biogas as Renewable Methane
  - Renewable Fuel for Vehicles
  - Needs to be Upgraded
  - Sweden now using extensively
- Project on dairy or cheese plant
  - CNG or LNG
- Convert to Liquid Fuel?
  - New technologies

# Lessons Learned


- Regulators ahead of technology
- Need research on emission controls
- Environmentalist support is critical
- Give up on electricity and convert biogas to biomethane fuel?
- CA as guinea pig for other states